

Attorney Docket No.: <u>COOL-00800</u>

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 3753

162 N. Wolfe Road Sunnvale, CA 94086

Customer No.: 28960

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TRANSMITTAL LETTER

Examiner:

ln	re	Αp	p.	lica	tion	ot:

Girish Upadhya et al.

Serial No.: 10/698,180

Filed: October 30, 2003

For: **OP**7

OPTIMAL SPREADER SYSTEM,

DEVICE AND METHOD FOR FLUID COOLED MICRO-SCALED

HEAT EXCHANGE

Commissioner for Patents P.O. Box 1450

Alexandria, VA 22313

Sir:

Enclosed please find an Information Disclosure Statement and Form PTO-1449, including copies of the references contained thereon, for filing in the U.S. Patent and Trademark Office.

You will also find enclosed the associated Transmittals, Electronic Information Disclosure Statements, and United States Patent and Trademark Office Acknowledgment Receipts for the electronically filed Information Disclosure Statement (EFS ID #57478); (EFS ID #57478); (EFS ID #57481); and (EFS ID #57483) filed on March 19, 2004.

The Commissioner is hereby authorized to charge any additional fee or credit overpayment to our Deposit Account No. <u>08-1275</u>. An originally executed duplicate of this transmittal is enclosed for this purpose.

Respectfully submitted,

HAVERSTOCK & OWENS LLP

Dated: 3/

Thomas B. Haverstock

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CERTIFICATE OF MAILING (37 CFR§ 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

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Date: 3-19-04 By:



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:) Group Art Unit: 3753
Girish Upadhya et al.	Examiner:
Serial No.: 10/698,180)) INFORMATION DISCLOSURE
Filed: October 30, 2003) INFORMATION DISCLOSURE) STATEMENT
)

For: OPTIMAL SPREADER SYSTEM,

DEVICE AND METHOD FOR) FLUID COOLED MICRO-SCALED)

HEAT EXCHANGE

162 N. Wolfe Road Sunnyvale, CA 94086 (408) 530-9700

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313

Sir:

The citations listed below, copies attached, may be material to the examination of the above-identified application, and are therefore submitted in compliance with the duty of disclosure defined in 37 C.F.R. §§ 1.56 and 1.97. The Examiner is requested to make these citations of official record in this application.

United States Patents or Published Patent Applications have been filed electronically (EFS ID #57478); (EFS ID #57479); (EFS ID #57481); and (EFS ID #57483). Applicants have become aware of the following printed publication which may be material to the examination of this application:

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This Information Disclosure Statement under 37 C.F.R. §§ 1.56 and 1.97 is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that anyone or more of these citations constitutes prior art.

Respectfully submitted,

HAVERSTOCK & OWENS LLP

Dated: 3-19-04

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Attorneys for Applicants

CERTIFICATE O: MAILING (37 CFR§ 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the U.S. Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450

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Sheet 1 of 7 FORM PTO-1449 U.S. Department of Commerce Serial No.: 10/698,180 Attorney Docket No.: COOL-00800 (Modified) Patent and Trademark Office INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use Several Sheets If Necessary) Applicants: Girish Upadhya et al. Group Art Unit: 3753 Filing Date: October 30, 2003 FOREIGN PATENTS OR PUBLISHED FOREIGN PATENT APPLICATIONS MAR 2 2 2004 Translation Document Number **Publication Date** Country / Patent Office Class Subclass Yes No BO1D 61/42 Х 97212126.9 03/04/97 CN ÃΑ Х 10/06/00 JΡ H01L 21/50 2000-277540 AB OTHER DOCUMENTS (Including Author, Title, Date, Relevant Pages, Place of Publication) Stephen C. Jacobson et al., "Fused Quartz Substrates for Microchip Electrophoresis", Analytical Chemistry, Vo. 67, No. 13, July 1, 1995, pages 2059-2063. AC Kendra V. Sharp et al., "Liquid Flows in Microchannels", 2002, Vol. 6, pages 6-1 to 6-38. AD Shuchi Shoji et al., "Microflow devices and systems", J. Microcech. Microeng. 4 (1994), pages 157-171, printed in the U.K. ΑE Angela Rasmussen et al., "Fabrication Techniques to Realize CMOS-Compatible Microfluidic Microchannels", Journal of Microelectromechanical, Vo. 10, No. 2, June 2001, pages 286-297. AF J. H. Wang et al., "Thermal-Hydraulic Characteristic of Micro Heat Exchangers", 1991, DSC-Vol. 32, Micromechanical Sensors, Actuators, and Systems, pages 331-339. AG Gad Hetsroni et al., "Nonuniform Temperature Distribution in Electronic Devices Cooled by Flow in Parallel Microchannels", IEEE Transactions on Components and Packaging Technologies, March 2001, Vol. 24, No. 1, pages 16-23. AH X. F. Peng et al., "Heat Transfer Characteristics of Water Flowing through Microchannels", Experimental Heat Transfer An International Journal, Vol. 7, No. 4, October-December 1994, pages 265-283. ΑI Linan Jiang et al., "Forced Convection Boiling in a Microchannel Heat Sink", Journal of Microelectromechanical Systems, Vol. 10, No. 1, March 2001, pages 80-87. AJ Muhammad M. Rahman et al., "Experimental Measurements of Fluid Flow and Heat Transfer in Microchannel Cooling Passages in a Chip Substrate", 1993, EEP-Vol. 4-2, Advances in Electronic Packages, pages 685-692. ΑK X. F. Peng et al., "Forced convection and flow boiling heat transfer for liquid flowing through Microchannels", 1993, Int. J. Heat Mass Transfer, Vol. 36, NO. 14, pages 3421-3427. AL Lung-Jieh Yang et al., "A Micro Fluidic System of Micro Channels with On-Site Sensors by Silicon Bulk Micromaching", September 1999, Microfluidic Devices and Systems II, Vol. 3877, pages 267-272. AM G. Mohiuddin Mala et al., "Heat transfer and fluid flow in microchannels", 1997, Int. J. Mass transfer, Vol. 40, No. 13, pages 3079-3088, AN M. Cuta et al., "Fabrication and Testing of Micro-Channel Heat Exchangers", SPIE Microlithography and Metrology in Micromaching, Vol. AΩ 2640, 1995, pages 152-160. Linan Jiang et al., "A Micro-Channel Heat Sink with Integrated Temperature Sensors for Phase Transition Study", 1999, 12th IEEE International Conference on Micro Electro Mechanical Systems, pages 159-164. AP Linan Jiang et al., "Fabrication and characterization of a microsystem for a micro-scale heat transfer study", J. Micromech. Microeng. 9 (1999) pages 422-428, printed in the U.K. AQ M. B. Bowers et al., "High flux boiling in low flow rate, low pressure drop mini-channel and micro-channel heat sinks", 1994, Int. J. Heat Mass Transfer, Vol. 37, No. 2, pages 321-332. AR AS Yongendra Joshi, "Heat out of small packages", December 2001, Mechanical Engineer, pages 56-58. A. Rostami et al., "Liquid Flow and Heat Transfer in Microchannels: a Review", 2000, Heat and Technology, Vol. 18, No. 2, pages 59-68. AT Lian Zhang et al., "Measurements and Modeling of Two-Phase Flow in Microchannels with Nearly Constant Heat Flux Boundary Conditions", Journal of Microelectromechanical Systems, Vol.11, No. 1, February 2002, pages 12-19. ΑU Muhammad Mustafizur Rahman, "Measurements of Heat Transfer in Microchannel Heat Sinks", Int. Comm. Heat Mass Transfer, Vol. 27, No. ΑV 4, May 2000, pages 495-506. Issam Mudawar et al., "Enhancement of Critical Heat Flux from High Power Microelectronic Heat Sources in a Flow Channel", Journal of Electronic Packaging, September 1990, Vol. 112, pages 241-248. AW Nelson Kuan, "Experimental Evaluation of Micro Heat Exchangers Fabricated in Silicon", 1996, HTD-Vol. 331, National Heat Transfer Conference, Vol. 9, pages 131-136. AX E. W. Kreutz et al., "Simulation of micro-channel heat sinks for optoelectronic microsystems", Microelectronics Journal 31(2000) pages 787-

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(Modified) INFO	ORMATIC	ON DISCLOSURE STATEMENT BY APPLICANT	Applicants: Girish Upadhya et al.	
(37 CFR § 1.9	8(b))	(Use Several Sheets If Necessary)	Filing Date: October 30, 2003	Group Art Unit: 3753
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FORM PTO-14 (Modified)	149	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No.: COOL-00800	Serial No.: 10/698,180		
,	RMATIO	ON DISCLOSURE STATEMENT BY APPLICANT (Use Several Sheets If Necessary)	Applicants: Girish Upadhya et al.			
(37 CFR § 1.9	B(b))	(Use Several Sheets II Necessary)	Filing Date: October30, 2003	Group Art Unit: 3753		
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` ,	RMATIC	ON DISCLOSURE STATEMENT BY APPLICANT (Use Several Sheets If Necessary)	Applicants: Girish Upadhya et al.	
(37 CFR § 1.98(Filing Date: October 30, 2003	Group Art Unit: 3753
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Electronic Version 1.1
Stylesheet Version v1.1.1

Title of Invention OPTIMAL SPREADER SYSTEM, DEVICE AND METHOD FOR FLUID COOLED MICRO-SCALED HEAT EXCHANGE

Submission Type:

Information Disclosure Statement

Application Number:

10/698180

10/698180

EFS ID:

57478

Server Response:

Confirmation Code	Message
IIISVRI	Submission was successfully submitted – Even if Informational or Warning Messages appear below, please do not resubmit this application
ICON1	9903
ISYS5	Filename= N/A BusinessRule= Validation System/Function Call Information. #Supporting Msg:Server unable to validate the Confirmaton/Application numbers at this time. They will be checked by PTO personnel later.

First Named Applicant:

Girish Upadhya

Attorney Docket Number:

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2004-03-19 11:44:56 EDT

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Page 2 of 2

File Listing:

Doc. Name	File Name	Size (Bytes)	
us-ids	COOL00800A-usidst.xml	8745	
us-ids	us-ids.dtd	7763	
us-ids	us-ids.xsl	12026	
package-data	COOL00800A-pkda.xml	1734	
package-data	package-data.dtd	27025	
package-data	us-package-data.xsl	19263	
	Total files size	76556	

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Page 1 of 2

Transmittal

10/698180 10/698180 Application Number:

OPTIMAL SPREADER SYSTEM, DEVICE AND METHOD FOR FLUID COOLED

MICRO-SCALED HEAT EXCHANGE

Invention Title of

TRANSMITTAL

Stylesheet Version v1.1.0

Electronic Version v1.1

Transmittal

2003-10-30

Girish Upadhya First Named Applicant:

Confirmation Number: 9903

Attorney Docket Number:

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Submitted by:	rhomas B. Haverstock Registered Number: 32571	The state of the s

Documents being submitted	Files
us-ids	COOL00800A-usidst.xml
	us-ids.dtd
	us-ids.xsl
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ELECTRONIC INFORMATION DISCLOSURE STATEMENT

Electronic Version v18 Stylesheet Version v18.0

> OPTIMAL SPREADER SYSTEM, DEVICE AND METHOD FOR FLUID Title of Invention COOLED MICRO-SCALED HEAT EXCHANGE

Application Number:

Confirmation Number: 9903 Girish Upadhya First Named Applicant:

Attorney Docket Number:

(3654988 or 3817321 or 3823572 or 3923426 or 3929154 or Search string:

4109707 or 4194559 or 4248295 or 4312012 or 4450472 or 4485429 or 4516632 or 4561040 or 4567505 or 4573067 or 4664181 or 4866570 or 4868712 or 4894709 or 4896719 or 4908112 or 4938280 or 5009760 or 5016138 or 5057908 or 5058627 or 5070040 or 5083194 or 5088005 or 5096388 or 5099311 or 5099910 or 5125451 or 5131233 or 5203401 or

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US Patent Documents

Note: Applicant is not required to submit a paper copy of cited US Patent Documents

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Information Disclosure Statement

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Examiner Name	Date